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SMALL MAMMALS AND NATURAL REFORESTATION IN SOUTHEAST ALASKA

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ABSTRACT

Biannual (May or June and September), small-mammal censuses were made for 9 years on a cutover and a timbered plot in Maybeso Creek valley near Hollis, Prince of Wales Island, Alaska. *Peromyscus*, *Microtus*, and *Sorex* were captured on both plots. Over the study period, *Peromyscus* were six times more plentiful in the timber, whereas *Microtus* were six times and *Sorex* twice as numerous on the cutting. The greatest number of animals were caught in the spring of 1958, the fewest in the spring of 1963. Adequate natural regeneration of approximately 550 Sitka spruce and western hemlock seedlings per acre became established on the cutover plot despite the presence of small mammals.

INTRODUCTION

When large-scale pulpwood logging began in southeast Alaska in 1953, small mammals were considered a hazard to natural conifer regeneration. Adequate natural reforestation is sometimes difficult to obtain on valley-bottom sites, and the presence of these animals, whose diet includes tree seeds and seedlings, was expected to aggravate the problem.

Small-mammal studies were started on the Maybeso Experimental Forest near Hollis, Prince of Wales Island, in 1954 (James 1956)[1] and expanded in 1956. Four species of small mammals were

[1] *Names and dates in parentheses refer to Literature Cited, p. 7.*

found living in the area (McGregor 1958): the deer mouse (Peromyscus maniculatus hylaeus (Osgood)), dusky shrew (Sorex obscurus longicauda (Merriam)), long-tailed vole (Microtus longicaudus littoralis (Swarth)), and northern flying squirrel (Glaucomys sabrinus zapheus (Osgood)). Beginning in 1957, an annual spring and fall census was made within a 700-acre clearcut and in an adjacent mature old-growth timber stand. Censuses continued through the regeneration period until 1965, when the study was terminated. This report describes fluctuations in small-mammal population during the regeneration period and the status of natural reforestation on the cutover study area 11 years after logging.

METHODS

In May 1957, two 1-acre trapping plots were located a half mile apart on nearly flat alluvial land in the Maybeso Creek valley. One plot was within a large cutting logged in 1955 (fig. 1), approximately 2,000 feet from the nearest seed source. The second was about 300

Figure 1.--*Cutover trapping site 11 years after logging (1965).*

feet from the edge of the clearcut beneath an overmature old-growth Sitka spruce (Picea sitchensis (Bong.) Carr.) and western hemlock (Tsuga heterophylla (Raf.) Sarg.) stand similar to the stand harvested on the cutover trapping site (fig. 2). The old-growth stand was somewhat open with a brushy understory of salmonberry (Rubus spectabilis),

Figure 2.--*Timbered trapping site (1965). The area supports an old-growth western hemlock–Sitka spruce stand.*

Pacific red elder (Sambucus callicarpa), and devilsclub (Oplopanax horridus). The timbered site contained 52 trees per acre ranging from 12 to 72 inches in diameter, with dominant spruce 200 feet tall. Gross stand volume was 156,000 board feet (Scribner) per acre.

Each trapping plot was gridded with 100 stakes arranged in 10 lines of 10 stakes each, at intervals of 20.8 feet. Outermost stakes were 10.8 feet inside the plot boundary. Each May or June and September during the study period, one snaptrap was set near a runway or under slash or a log near each stake. Ordinary household mousetraps were used, baited with a mixture of peanut butter and oatmeal.

Trapping was done for three consecutive nights, with traps set and examined daily. The genus, age, and sex of each trapped animal were recorded by date and location.

Stocking percent, number of seedlings per acre, and vegetative cover on the cutover plot were determined at the end of the 1966 growing season from examination of one hundred 4-milacre quadrats centered about stakes marking trap locations.

RESULTS

During the study period, twice as many animals were captured on the timbered area as on the clearcut area, an average of 32 animals per trapping period in the timber and 16 on the cutting. Peromyscus were the most numerous in the timbered habitat, but Microtus and Sorex preferred the more open conditions on the cutting. Peromyscus were six times more plentiful in the timber, whereas Microtus were six times and Sorex over twice as numerous on the cutting. Although flying squirrels were known to live in the area, none were caught, probably because the traps used were too small.

Population peaks differed by species and habitat, but the high population levels which occurred during 1958 were not repeated during the study period. The greatest number of animals were caught in the spring of 1958, the fewest in the spring of 1963 (fig. 3).

Next to small mammals, large slugs, tentatively identified as Ariolimax columbianus (Gould), were the most numerous animals captured. Slugs were adept at removing bait without springing traps, as shown by the slime trail on many robbed traps, and when caught they deposited a sticky mass of slime on the trap. Thus, slugs spoiled many traps for exposure to small mammals.

A heavy crop of both hemlock and spruce cones occurred in 1959, with seedfall beginning in October and extending into the following spring. However, small-mammal populations appeared to be little affected in 1960. Apparently, neither the abundant seed nor unusually heavy seedling germination had a pronounced effect on population numbers.

By the end of the study period, the cutover plot was adequately stocked with spruce and hemlock seedlings. Fifty percent of 4-milacre plots were stocked with at least one well-established seedling at least 6 inches tall, and conifer reproduction occupied 7 percent of the ground cover. Average height of the largest spruce on each quadrat was 8 feet; hemlock, 13 feet. Approximately 440 spruce and 110 hemlock seedlings per acre were established. Most dominant seedlings were established during the first 2 years after logging or were advanced seedlings already established before logging. No seedlings were established after 1960. Dense brush became established soon after logging. In 1966, salmonberry, lady fern (Athyrium filixfemina (L.) Roth.), and various grasses and sedges were the most common species, occupying 39, 26, and 16 percent of ground cover, respectively. Vegetation on the study plot appeared to be representative of the surrounding area.

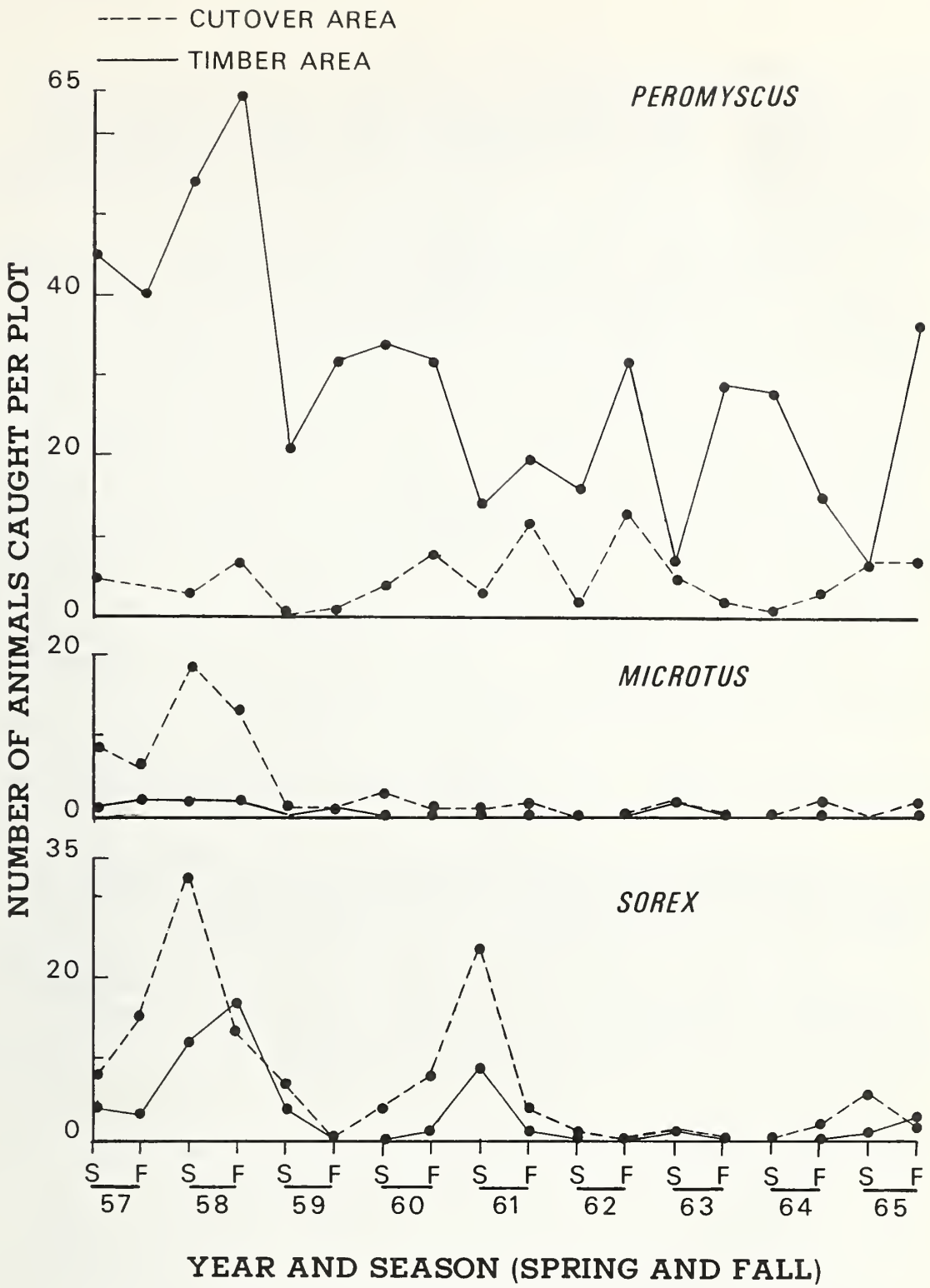

Figure 3.--*Number of small mammals caught during 3 nights on which traps were set on cutover and timberland, 1957-65. Maybeso Experimental Forest.*

DISCUSSION

The theory underlying population estimates by the removal method is that, if an area is saturated with traps for a period of several nights, the entire resident population or a substantial fraction thereof may be removed.

As pointed out by Zippin (1958) one would expect the greatest number of individuals to be caught and removed the first night, with fewer individuals caught each succeeding night until the population became depleted. In the study reported here, this pattern was apparent in less than 15 percent of the trapping periods, and in 20 percent of the periods, more individuals were trapped on the last night than on the first. Most of the time, no particular pattern was evident. Although weather, especially rain, may have been a factor in animal activity, no correlation with number of captures was apparent. When all trapping periods were averaged, the percentage of animals trapped during three successive nights was: Peromyscus, 39, 33, and 28; Microtus, 44, 28, and 28; Sorex, 34, 30, and 36. Thus, a composite view of captures would seem to indicate that three trapping nights were insufficient to capture all resident animals, or that nonresidents moved into the trapping areas. Therefore, the numbers shown in figure 3 probably do not indicate the total population. However, they are useful as an index of relative abundance over the study period. The cumulative effect of biannual trapping on population numbers is not known.

It has been reported that Peromyscus populations and most Microtus and Sorex populations increase after logging, although exceptions occur. For example, in the California Douglas-fir region, Tevis (1956) found that logging caused an increase in the numbers of Peromyscus and a decrease in the numbers of Sorex. In the case of Peromyscus, the differences were most marked on a 6-year-old cutting, least on a 20-year-old cutting. Thus, in the study reported here, the finding that, at least after the 2d year following logging, fewer Peromyscus were caught on the cutting than in timber was unexpected. The reason is not known.

A small-mammal census was not made during the 1st year after clearcutting, and annual records of seed or seedling losses were not obtained. As a consequence, it is impossible to determine the extent of damage caused or what stocking percent and number of seedlings per acre would have been established had small mammals been absent. However, it is evident that adequate natural regeneration has become established 2,000 feet from the nearest seed source despite the presence of a resident small-mammal population.

Many studies have shown that caged small mammals will consume large quantities of tree seed, and damage to seed and seedlings in the field has been noted (Radwan 1963). Thus, in some cases, small mammals may be a serious threat to regeneration.

At one time, small mammals were thought to be only detrimental to the forest because of their known habits of eating tree seed and seedlings. However, small mammals also have a useful place in forest ecology (Hamilton and Cook 1940; Hamilton 1941). Their insectivorous nature, large numbers, and year-round activity may make them more useful than birds in controlling some insect pests. They are active on the forest floor in working the soil and duff layers, allowing better penetration of air and water. They also serve as food for important fur bearers and act as buffer species, lessening predation on some species of small game. In view of their useful role in forest ecology, it is encouraging to find that small mammals may not be an obstacle to natural conifer regeneration in southeast Alaska.

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